

## CLAIMS

1. Laser machining device for drilling holes in fluid injection device components, particularly for injecting fuel into a combustion engine, said machining device comprising a laser resonator (4, 50) formed of a first solid state active medium and first optical pumping means, said first optical pumping means being formed by  
5 laser diodes, characterized in that:
  - Said resonator is arranged for generating primary pulses having a length within or greater than the microsecond range;
  - the machining device further includes modulation means (8) arranged  
10 between said resonator (4) and a machining head (24), said modulation means being controlled to supply a secondary pulse train (12) at output for each primary pulse (10) entering therein.
2. Device according to claim 1, characterized in that it includes an optical diode (18) arranged downstream of said resonator.
3. Device according to claim 1, characterized in that it further includes  
15 means for amplifying the pulses supplied by said resonator.
4. Device according to claim 2, characterized in that it further includes means for amplifying the laser pulses supplied by said resonator, said amplification means (22) being arranged downstream of said optical diode (18).
5. Device according to claim 2 or 4, characterized in that said optical diode  
20 is formed by a linear polarizer and by a quarter-wave plate arranged following said polarizer.
6. Device according to claim 3 or 4, characterized in that said amplification means are controlled so as to provide amplification pulses with a time lag relative to the primary pulses in order to modulate the amplitude of said secondary pulses.
- 25 7. Device according to claim 3 or 4, characterized in that said amplification means include a cavity formed by a second solid state active medium and by second optical pumping means formed by a flash lamp.
8. Device according to claim 6, characterized in that said amplification means include several active mediums defining several amplification levels, each of  
30 said active mediums being pumped by a flash lamp.
9. Device according to any of the preceding claims, characterized in that said resonator is arranged for supplying at the outlet thereof a linearly polarized laser beam.

10. Device according to claim 8, characterized in that said first active medium is formed by a crystal selected from among crystals that directly generate a linearly polarized light, in particular a Nd:YVO<sub>4</sub> crystal.

11. Device according to any of the preceding claims, characterized in that it  
5 is arranged for supplying pulses in the microsecond range whose energy enables a hole to be drilled in a given component by a single primary pulse generated by said resonator.